

Cavernicolous Diptera of the Geneva Museum

by

L. PAPP *

ABSTRACT

Locality data of 61 dipterous species of 13 families are listed from materials of the Geneva Museum (mainly from W Europe). As an introduction the characteristics of the species-composition and those of the true cavernicolous Diptera of Europe and some of their evolutionary aspects are summarized.

INTRODUCTION

There is a significant number of papers on flies collected in caves, however the research work in several cavernicolous groups of animals is far more advanced than in dipterology. The earlier works on cavernicolous flies were summarized by WOLF (1934-38); among the papers after his Catalogues only LERUTH 1939, COLLART 1940, 1942, VANSCHUYTBROECK 1943, SÉGUY 1963, AELLEN & STRINATI 1962, MATILE 1962, PAPP & PLACHTER 1976 are mentioned here, but, in the last four decades several dozens of papers contain data on cave-dwelling flies. In contrast to these facts, I am sad to say, our knowledge on the general relations of cavernicolous flies to their habitat has been little enriched during recent years. The principal reasons for this situation may be summarized as follows: 1) The dipterists accepted readily all of the reasoning in the general relations of the cavernicolous animals, which were based on animal groups other than flies. 2) The majority of the dipterological works was based on small materials collected in a given country or region. 3) The overwhelming majority of these fly materials were collected in the entrance zones of caves, and thus numerous dipterous species were regarded as "cavernicolous", although they only enter the caves accidentally (e.g. Tachinidae). 4) The life habits of numerous dipterous species were unknown, this is why earlier authors were unable to judge whether a given fly species was cavernicolous or not. 5) The identification of flies was made by non-specialists with some exceptions, or, one dipterist alone was not able (and cannot be able) to identify every fly species. All these resulted in publications of misidentifications, in misinterpretations of species.

* Zoological Department, Hungarian Natural History Museum, H-1088 Budapest, Baross u.13, Hungary.

Let me illustrate this severe judgment by two examples. COLLART 1942 published trogloneic species without exception under the title biospeleology. VANSCHUYTBROECK's (1943) paper involved partly misidentifications, partly trogloneic species, only a half of his species belongs to the group which propagate in the aphotic parts of caves. His table to summarize the occurrence data of the species of Sphaeroceridae in caves of Europe is a very useful summary but among the 38 species listed there was only one true cavernicolous species and 11 trogloneophilous species.

In recent years our knowledge on cavernicolous flies has been enhanced not only quantitatively but qualitatively. This is a consequence of the development of our science and the exclusion of the above mentioned failures. Namely,

1) Several dipterous groups have been revised, in which at least some of the species are cavernicolous (Trichoceridae, Limoniidae, some Mycetophiloidea groups, Sphaeroceridae, Helomyzidae; e.g. BOURNE 1979, several works of Matile, Plassmann and Plachter, GORODKOV, 1962, 1970, ROHÁČEK 1976, etc.); thus the taxonomical reference basis has been much widened and hence the exact identification of the cave-dwelling species becomes possible (eventually also for non-specialists in dipterology).

2) Some very extensive (and well-dated) materials were collected (first of all for the collection of Muséum d'Histoire naturelle Genève) in caves. The study of these materials enables us to reevaluate the conclusions, which were based on former scattered and non-systematical collections.

3) The part of the reference basis for species has been very much widened, which is incorrectly called "autecology" (the better knowledge of the life habits of species, of their physiological characteristics and potentials, of the population dynamics, etc.).

After studies on the large dipterous cavernicolous materials of the Geneva Museum (PAPP 1978 and materials below) and after reevaluating a significant part of the data in earlier literature, the present author thinks that it is possible to remark on some more general points, such as the species compositions of the cave-dwelling flies of Europe and the characteristics of the true cavernicolous fly species. It is clear that the present author was not able to identify all of the dipterous species collected in caves but after a work in several fly families, which are not related, he thinks that the identification of the remaining groups will not result in major changes of the general picture outlined below.

The fly species other than listed below were sorted out into families and genera. In the collection of the Muséum d'Histoire naturelle Genève there are important materials of Sciaridae, Mycetophilidae, Bolitophilidae (species of the genera Bolitophila and Messala), Psychodidae, Culicidae, Limoniidae (mainly species of Limnobia), Dolichopodidae, which are still awaiting identification work by specialists in these groups.

We may state that:

1) The dipterous fauna of European caves is very poor in species. It is apparent that among the 110 fly families which occur in Europe not more than nine involve true cavernicolous species and trogloneophilous species; they are as follows:

- Trichoceridae (4-5 species)
- Sciaridae
- Mycetophilidae
- Bolitophilidae (4-5 species)
- Limoniidae
- Lonchopteridae (2 species)

Phoridae
Helomyzidae
Sphaeroceridae

There are eight other families containing species, which occur abundantly in caves in the imago form (the position of the nycteribiid species is special): Anisopodidae, Cecidomyiidae, Psychodidae, Culicidae, Dixidae, Dolichopodidae, Milichiidae, Nycteribiidae.

2) The true cavernicolous species only occur in a single cave or continuous cave system. The Grundwasser, or water generally, cannot play a rôle in their distribution; their physiological abilities, which are adapted to the cave habitat (i.e. not only to the cold and humid conditions but also to complete darkness), do not permit them to go from one cave to another. There are extremely few of these species in Europe, namely: three species of *Copromyza* (subgenus *Speomyia*): *absoloni*, *hungarica*, *parentela*, two undescribed species of the subgenus *Copromyza* (*Crumomyia*) from the St-Vincent cave (France) and *Gymnomus troglodytes* Loew. Probably some species of *Niphadobata* and a small number of the species of Sciaridae and Mycetophilidae occurring in caves will prove to be true cavernicoles.

3) The true cavernicolous species are isolated not only in space but also in time from the fauna of the area around the entrance of caves. That is to say that the true cavernicolous species originate from species, which lived at different periods of the Pleistocene (evidence, not detailed here, gives the time lapse for this period as less than 500,000 years). Those ancestral species were adapted to the cold and humidity and in these respects they were stenoec species. They found a shelter in caves from higher temperature and relative dryness in warmer periods, but in the course of their adaptation to the cave habitat their physiological potentials suffered changes, and these latter changes condemned them to caves. It is worth mentioning that there is no trace of the so-called terciar elements in the cavernicolous fly fauna of the European caves (c.f. Coleoptera). All of the other flies, which are collected in caves, including also the troglophilous species (see below) can be included in the fauna of the surrounding area of the cave entrances, particularly in winter.

4) Beside the true cavernicolous species it seems necessary and reasonable to separate another group: the species which are not true cavernicolous but which are able to complete their life cycle in the aphotic parts of caves with constant temperature and humidity values (*Triphleba antricola*, *Limosina bequaerti*, *Limosina racovitzai*, *Scolio-centra villosa*, *Helomyza captiosa*, etc.). This is the group which we may name as troglophilous to make a severe distinction, since these species occur not only in caves but also in cellars, rock-slits, and in burrows of small mammals. The number of these species is also very low when compared to the total fly fauna of a given country. They occur widely in many caves of Europe and the group embodies the majority of the specimens of flies in the aphotic parts of European caves. In winter these troglophilous species are found crawling on soil surface or on snow and they also occur in places like stables, cesspools, open-air lavatories, etc. During the cold season with low temperature and high humidity they are able to move from one cave to another. The grouping of all the other species (i.e. not true cavernicolous and not troglophilous species) — including the present author's acceptance of the grouping proposed by Dudich 1932 (see PAPP & PLACHTER 1976) — is unreasonable, as the other species differ from each other and may only be treated species by species. Any fly species can enter a cave by chance and the probability of an occurrence is different for each species reflecting the differences in their life habits.

5) The true cavernicolous species or the island species (see Darwin) give fine examples to demonstrate the existence of evolution. However the study of cavernicolous species (incl. flies) are not exemplary for the exploration of the more general processes of evolution, because they are blind alleys of evolutionary lines. New evolutionary lines cannot develop from these species and they will become extinct together with the destruction of their cave or cave system or by major changes in the ecological factors of their cave. Thus we may suppose, not without reason, that numerous cavernicolous species have become extinct during past geological ages without leaving trace of the existence. The consequence of Item 3 for the general theory of evolution is that if there are changes in the milieu (even major ones), the species are not obliged to adapt to that changed milieu by changes of their properties but they can find a milieu where they are able to survive without any changes in some of their characteristics (physiological potentials determined by the genetical code). For the other (ecological and morphological) characteristics of the true cavernicolous flies see the summary of PAPP & PLACHTER 1976.

It seems necessary to insist that all these statements refer only to the caves of Europe, which were greatly influenced by the Ice Ages. In the caves of North Africa some (2-3) species of Dolichopodidae appear to dominate, in African caves some nematocerans (Sciariidae, ?Cecidomyiidae); while in the caves of tropical areas species of Chyromyidae, Milichiidae and Chloropidae are to be found.

Below, the data for 1576 fly specimens of 61 species of 13 Dipterous families are listed which were collected in more than 60 caves of Switzerland, nearly 70 caves of France and one to three caves each of Italy, Austria, Germany, Great Britain, Yugoslavia, Morocco, New Caledonia and Kenya. Other than the species listed here five species new to science were found (two species of subgenus *Copromyza* (*Crumomyia*) from France, one species of *Phyllomyza* from Sri Lanka and two species of *Leptometopa* from the Fiji Is.), which will be described in a future paper. In the fly families listed below one species each of *Prosopanthrum* (*Helomyzidae*) and *Pholeomyia* (*Milichiidae*) and the species of *Megaselia* (*Phoridae*) and some females of *Drosophila* remain unnamed. Listing the locality data the names of collectors, who collected the majority of these materials, are given in short, as follows: A = Villy Aellen, B = John D. Bourne, C = J. Colin, hC = H. Colin G = R. Gigon, H = Berndt Hauser, J = J. P. Jéquier, R = Ch. Roth, S = Pierre Strinati, Sp-Cl = Spéléo-Club des Montagnes Neuchâteloises.

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DIPTEROUS SPECIES AND THE CAVES WHERE THEY WERE COLLECTED

TRICHO CERIDAE

Trichocera hiemalis (De Geer, 1776)

SUISSE: grotte de la Baume, NE 4, 11.7.78 (S, A): 2/1; FRANCE: gr. du Cormoran, Torcieu, Ain, 3.76 (B): 0/1.

A common species in Europe in winter; its larvae develop also in entrance zone of caves.

Trichocera maculipennis Meigen, 1818

SUISSE: gr. des Dentaux, VD 21, 20.6.79 (A, S): 0/1; gouffre du Chevrier, VD 39, 14.6.64 (S, R, A): 0/1; Cave Noire, VD 43, 26.5.60 (S): 1/0; Nidlenloch, SO 1, 25.5.72 (S, A): 1/0; Höhle am Rütstein, SZ, 2.7.67 (S, A): 0/1. FRANCE: gr. du Brudour, Drôme, 30.6.80 (S, A): 1/0; gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., 11.4.77 (B): 3/4. 13 specimens.

Trichocera regelationis (Linné, 1758)

SUISSE: gr. aux Fées supérieure de Vallorbe, VD 6, 20.3.79 (S, A): 1/1; gr. du Grand Bochat, NE 33, 17.7.78 (S, A): wings of a specimen; gr. de Prépunel, NE 12, 8.10.78 (A): 0/1; FRANCE: gouffre G 10, Bois du Petit Faily, Meuse, 10.77 (P. Gomez): 3/6; gouffre G 7, ibid.: 0/1; gr. du Cormoran, Torcieu, Ain, 3—27 m, 12.75, 3.76, 4.76 (B): 0/13; gr. de l'Evêque, Torcieu, Ain, 12.75 (B): 0/2; grotte des Cinq, Torcieu, Ain, 12.75, 3—5.76 (B): 0/10; gr. des Droums, Goumois, Doubs, 17.10.61 (G): 0/1; gr. de Montecey, Hte-Saône, 20.4.66 (hC): 0/1; gr. de la Baume, Echenoz-la-Méline, Hte-Saône, 31.11.66 (hC): 1/0. 42 specimens. Its larvae are frequently found in caves, thus it can be regarded as a troglophilous species.

Trichocera saltator (Harris, 1782)

SUISSE: gr. de St-Brais I, BE 9, 23.4.64 (A, S): 0/1. FRANCE: gr. des Cinq, Torcieu, Ain, 11.76, 3.76 (B): 1/12.

Rarely found in caves (cf. also STRINATI 1966).

LIMONIIDAE

Rhypholophus haemorrhoidalis (Zetterstedt, 1838)

FRANCE: gouffre G 10, Bois du Petit Faily, Meuse, 10.77 (P. Gomez): 1/0.

The majority of the Limoniids in these materials (mainly *Limnobia* species) were left unnamed this time, only this species with peculiar male genitalia was identified; first record from caves.

ANISOPODIDAE

Anisopus fenestralis (Scopoli, 1763)

FRANCE: gr. du Cormoran, Torcieu, Ain, 5.76, 6.76 (B): 0/3; gr. des Cinq, Torcieu, Ain, 12.75, 4.76, 6.76 (B): 10 ex.; gr. de l'Evêque, Torcieu, Ain, 3 m, 6.76, 10.76 (B): 1/1. 15 specimens.

Surely not a troglophilous species but often collected in the entrance zone of caves. Its larvae develop in sap of wounds of trees.

MYCETOBIIDAE

Mycetobia pallipes Meigen, 1818

FRANCE: gr. des Cinq, Torcieu, Ain, 6.76 (B): 0/1.

A rare European species; first record from caves.

LONCHOPTERIDAE

Lonchoptera tristis Meigen, 1824

SUISSE: gr. du Condor, BE 40, 3.9.80 (S): 1/0. FRANCE: gr. du Cormoran, Torcieu, Ain, 3—15 m, 8.76—10.76 (B): 12/6; grottes de Rochecourbon, St-Porchaire, Char-Mar., 2.8.78 (A): 2/2.

Repeatedly found in caves (e.g. AELLEN & STRINATI 1962, STRINATI 1966) but not troglophilous.

PLATYPEZIDAE

Platypeza aterrma Walker, 1849

FRANCE: gr. de l'Evêque, Torcieu, Ain, 4.76, 10 m (B): 1/0.

Trogloxic; its larvae develop in all probability on fungi.

PHORIDAE

Tripleba antricola (Schmitz, 1919)

GERMANY: Erdmannshöhle, Hasel/Wehr, 6.5.65 (A, S): 2/0. AUSTRIA: Weinstockstollen III bei Innsbruck (Tirol), Barberfalle, 6.12.65 (H): 3/6.

SUISSE: gr. de St-Martin, VS 1, 2.5.80 (S, A): 3/0; *ibid.*, pièges, 11.7: 1/36; gr. de la Fenatte, Epauvillers, Jura, 17.9.78 (A, S): 0/2; gr. des Roches Bornel, NE 42, 17.7.78 (S, A): 1/1; Böcc de la Ratategna, TI 27, 7.8.62 (A, S): 0/3; gr. du Pontet I, VD 29, 30.8.77 (H, S): 1/22; *ibid.*, piège du 11 au 30.8.77 (S, H): 0/12. FRANCE: gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., piège molester, 12.7.78 (B): 1/0; gr. des Cinq, Torcieu, Ain, 6.76—12.76 (B): 5/15; gr. du Lichen, Onnion, Hte-Savoie, 19.8.64 (S, A, R): 1/1; gr. de Chariez, Hte-Saône, 9.3.72 (hC): 0/1; gr. de Montcey, Hte-Saône, 16.3—5.11.66 (hC): 6/39; gouffre de Malatrait, La Pesse, Jura, 22.8.68 (C): 0/1; gr. de Combe-l'Epine, Calmoutier, Hte-Saône, 25.4.66 (hC): 0/1; gr. de Champdamay, Quincey, Hte-Saône, 28.5.66 (hC): 1/5; gr. du Queire, Ariège, 17.10.70 (S): 0/1; gr. de Grange-Mathieu, Chenecey, Doubs, 18.8.68 (hC): 2/7; gr. Beaumotte, Montbozon, Hte-Saône, 12.3.72 (hC): 0/1; gouffre du Bois de Banc, Les Bouchoux, Jura, 20.8.66, 10.8.68 (C): 0/2; gr. de la Baume, Chaux-les-Port, Hte-Saône, 29.9.67 (hC): 0/2; trou du Bouc, Granges-le-Bourg, Hte-Saône, 19.3.72 (hC): 0/1; trou de la Cottelotte, Dampvalley-lès-Colombe, Hte-Saône, 26.12.66 (hC): 0/1; gr. de la Baume, Echenoz-la-Méline, Hte-Saône, 25.5.66, 31.11.66 (hC): 13/44; gr. de Cerre-lès-Noroy, Hte-Saône, 10.7.68

(hC): 0/3; goulet de la Vouivre, Matafelon, Ain, 21.3.64 (C): 1/0; gr. de Quincey, Hte-Saône, 3.12.66 (hC): 1/6; gr. de Chagez, Hte-Saône, 16.3.72 (hC): 0/1; trou des Araignées, Presle, Hte-Saône, 12.3.72 (hC): 0/1; de la Grande Baume, Chaux-lès-Port, Hte-Saône, 10.6.66 (hC): 0/4; gouffre G 10, Bois du Petit Faily, Meuse, 10.77 (P. Gomez): 0/3; gouffre de Lent, Torcieu, Ain, 29.7.76—20.10.77 (B): 12/143; gr. de l'Evêque, Torcieu, Ain, 3.76—10.76 (B): 13/24; gr. du Cormoran, Torcieu, Ain, 3 m—30 m, 12.75—3.76 (B): 16/40; *ibid.*, COD 9, 21.7.77 (B): 1/0. 83 ♂, 433 ♀ = 516 specimens.

This is the most typical troglophilous species of the European flies; at the same time it is very abundant. Found also in other European countries (see Wolf 1934-38).

***Triphleba aptina* (Schiner, 1853)**

AUSTRIA: Weinstockstollen III bei Innsbruck (Tirol), Barberfalle, 6.12.65 (H): 17/19. SUISSE: Grand creux de Montfaucon, BE 37, 28.9.77 (S): 1/3. FRANCE: gr. du Cormoran, Torcieu, Ain, 6.76, 19 m, (B): 0/1; gr. des Ecolais D, Choux, Jura, 17.8.66 (C): 0/2; gouffre de Lent, Torcieu, Ain, 29.7.76—20.10.77 (B): 10/37. 28 ♂, 62 ♀ = 90 specimens. A troglophilous species, though less common than *antricola*; sometimes collected together.

DRYOMYZIDAE

***Neuroctena anilis* (Fallén, 1820)**

FRANCE: gouffre de Lent, Torcieu, Ain, 21.6.77 (B): 0/1.

Not troglophilous but sometimes found in caves (e.g. STRINATI 1966).

HELOMYZIDAE

***Suillia affinis* (Meigen, 1830)**

FRANCE: gouffre de Lent, Torcieu, Ain, 29.7.76, 21.6.77, 20.10.77 (B): 2/4; gr. des Cinq, Torcieu, Ain, 1 m outside, 7.76, 10.76 (B): 2/0. All parts of Europe; larvae in fungi, imagoes often found in soil traps.

***Suillia bicolor* (Zetterstedt, 1838)**

FRANCE: gr. des Cinq, Torcieu, Ain, at entrance, 10.76 (B): 1/2. A Palearctic species, larvae common in fungi.

***Suillia fuscicornis* (Zetterstedt, 1847)**

FRANCE: gouffre de Lent, Torcieu, Ain, S3, 23.11.76 (B): 1/0.

A Palearctic species; reared from several species of mushrooms but less common than *bicolor*.

Suillia laevifrons (Loew, 1862)

FRANCE: gouffre de Lent, Torcieu, Ain, S2, 21.6.77 (B): 0/3; gr. des Cinq, Torcieu, Ain, 1 m outside, 10.76 (B): 1/0.

Known from North Europe and in central zone of Europe; a trogloxenic species.

Suillia notata (Meigen, 1830)

FRANCE: gouffre de Lent, Torcieu, Ain, 31.8.77, 23.11.76 (B): 1/3.

A Palaearctic species, known also from North Africa and Greece, often found on mushrooms (larvae develop in fungi).

Suillia pallida (Fallén, 1820)

FRANCE: gouffre de Lent, Torcieu, Ain, S1, S3, 23.11.76 (B): 2/4; gr. des Cinq, 1 m outside, at entrance, 12.75, 3.76 (B): 4/3. 13 specimens. A less known Palaearctic species; its life habits are largely unknown but it is surely a trogloxenic species.

Suillia variegata (Loew, 1862)

FRANCE: gouffre de Lent, Torcieu, Ain, S1, 20.4.77 (B): 0/1.

Trogloxenic; larvae develop in fungi; known from central and southern zones of Europe, Asia minor and North Africa.

Heteromyza atricornis Meigen, 1830

MOROCCO: gouffre du Friouato, 1.10.79 (A, S): 0/1. SUISSE: gr. de Môtiers, NE 8, 4.2.62. (R): 0/2; gr. du Crozot, NE 41, 15.10.56 (Schnyder): 0/1; gr. du Chapeau de Napoléon, NE 43 (3.102) 1961, (J): 0/3; gr. de la Toffière, NE 46, 13.4.61 (S, A): 0/1; gr. de Réclère, BE 3, 24.5.72 (S, A): 0/1; Kohlerhöhle, BE 45, 24.4.60 (S): 0/1; gr. de Lajoux, BE 10, prélèvement de terre et bois pourri, 28.9.77 (B, H, S): 2/2; FRANCE: grotte inférieure du Queire (= gr. du Ker), Ariège, 17.10.70 (S): 2/1; *ibid.*, triage, 7.10.77 (S): 0/6; gouffre de Lent, Torcieu, Ain, 29.7.76—20.10.77 (B): 0/77; gr. de Combe-l'Epine, Calmoutier, Hte-Saône, 25.4.66 (hC): 0/2; gr. de Champdamay, Quincey, Hte-Saône, 28.5.66 (hC): 0/9; gr. du Maquis, Coisertte, Jura, 9.4.66 (C): 0/1; gr. de la Baume, Chaux-les-Port, Hte-Saône, 29.9.67, 26.11.72 (hC): 0/3; gr. de la Baume, Echenoz-la-Méline, Hte-Saône, 25.5.66 (hC): 0/2; gr. de Cerre-les-Noroy, Hte-Saône, 7., 10.7.68 (hC): 0/3; gr. de Combe-la-Botte, Colombotte, Hte-Saône, 16.5.66 (hC): 0/3; gr. de la Grande Baume, Chaux-lès-Port, Hte-Saône, 10.6.66 (hC): 0/1; Pertuis de Méailles, Méailles, Alpes Hte-Provence, 4.3.77, 7.6.77 (B): 0/12; gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., 12.8.78 (B): 0/3; gr. de Pont-la-Dame, Aspres-sur-Buëch, Htes-Alpes, 5.5.77 (B): 0/30; gr. des Cinq, Torcieu, Ain, 12.75—11.76 (B): 0/38; gr. de l'Evêque, Torcieu, Ain, 3—40 m, 4.76—12.76 (B): 0/68; gr. du Cormoran, Torcieu, Ain, 3—35 m, 12.75—12.76 (B): 0/46; *ibid.*, COD9, 17.7.77 (B): 0/1. 4 ♀ = 322 specimens.

Together with *Triphleba antricola*, this is the commonest troglophilous fly in Europe (found also in North Africa). In the overwhelming majority of the caves its populations

propagate parthenogenetically; among the 29 caves of the present materials males were found in only two caves.

***Oecothea praecox* Loew, 1862**

FRANCE: trou des Araignées, Presle, Hte-Saône, 12.3.72 (hC): 0/1; gr. de Pont-la-Dame, Aspres-sur-Buëch, Htes-Alpes, 5.5.77 (B): 1/0; gr. du Cormoran, Torcieu, Ain, 10 m, 7.76 (B): 1/0.

Known only from the medial zone of Europe from France to Hungary. A troglophilous species found also in cellars.

***Eccoptomera emarginata* Loew, 1862**

SUISSE: gr. de Vers-Chez-de-Brandt, NE 1, 27.8.80 (H, S, A): 1/0. An European species; found also in caves but not common there.

***Eccoptomera pallescens* (Meigen, 1830)**

GERMANY: Nebelhöhle, Genkingen, 24.9.69 (A, S): 1/0. SUISSE: gr. de Vers-chez-la-Brandt, NE 1, 27.8.80 (H, S, A): 0/1; gr. de Prépunel, NE 12, 8.10.78 (A): 1/0; gr. de Réclère, BE 3, 30.9.56 (R, S): 0/1; Hölloch, SZ 1, 1970 (Fuchs): 1/0; baume de Bêtre, VS 12, 10.8.62 (A, S): 0/1; gr. de Lajoux, BE 10, 28.9.77 (B, H, S): 5/3; FRANCE: gr. du Lichen, Onnion, Hte-Savoie, 19.8.64 (S, R, A): 0/1; gr. de la Diau, Thorens, Hte-Savoie, 9.12.65 (S, A): 1/0. 16 specimens.

A troglophilous species; it occurs not only in Europe but also in the Caucasus.

***Eccoptomera sanmartini* Czerny, 1924**

FRANCE: gr. du Lichen, Onnion, Hte-Savoie, 19.8.64 (S, R, A): 1/2. An extremely rare species, hitherto known only from its type-locality (San Martino d. C.). New to France.

***Anypotacta setulosa* Czerny, 1924**

SUISSE: gr. du Bois du Corps de Garde, VD 24, 22.2.62 (S, A): 0/1. A very rare species, new to Switzerland; hitherto known only from Austria, Germany and South Poland.

***Helomyza captiosa* (Gorodkov, 1962)**

GREAT BRITAIN: South Wales: Ogof-Rhyd Sych, 18.10.77 (B): 2/3. AUSTRIA: Weinstockstollen III bei Innsbruck (Tirol), Barberfalle, 6.12.65 (H): 1/0. SUISSE: gr. Roches Bornel, NE 42, 17.7.78 (S, A): 1/2 (one of the females with numerous mites); gr. des Dentaux, VD 21, 20.6.79 (S, A): 0/1; Cave Noire, VD 43, 26.5.60 (S): 1/0; Arlesheimer Höhle I, BL 3, 17.4.60 (S): 1/0; gr. du Bois du Corps de Garde, VD 24, 22.2.62 (S, A): 0/1. FRANCE: gr. du Brudour, Drôme, 3.6.80 (A, S): 0/1; gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., piège molester, 12.7.78 (B): 1/1; gr. du Lichen, Onnion, Hte-Savoie, 19.8.64 (S, R, A): 1/0; gr. de la Diau, Thorens, Hte-Savoie, 9.12.65 (S, A): 1/0; gr. du Mémont, Le Russey, Doubs, 31.12.63 (G, A): 1/1; trou de la Cotellette,

Dampvalley-les Colombe, Hte-Saône, 26.12.66 (hC): 1/2; gr. de Prérrouge, Arith, Savoie, 1.2.64 (J. Martini): 1/0; gr. du Cormoran, Torcieu, Ain, 7 m—27 m, 12.75—6.76 (B): 10/4; *ibid.*, COD1, 14.7.77 (B): 9/12; *ibid.*, COD11, 21.7.77 (B): 1/0; gouffre de Lent, Torcieu, Ain, 20.4.—20.10.77 (B): 1/1. 62 specimens.

A common troglophilous species. In winter it has been found also in lavatories, pig stables and in cellars. New to Austria (for distribution see PAPP 1978).

Helomyza modesta Meigen, 1838

SUISSE: gr. aux Fées supérieure de Vallorbe, VD 6, 20.3.79 (S, A): 1/0.

Its distribution ranges from Lappland to Italy; rarely collected in caves, probably not troglophilous.

Helomyza serrata (Linné, 1761)

FRANCE: gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., 3.11.77 (S): 1/0.

A little known species; in many cases reported from caves but almost all records refer to *H. captiosa* Gor.

Scoliocentra brachypterna (Loew, 1873)

SUISSE: gr. de Pertuis, NE 26, 3.58 (G): 1/0.

A little known species. Found also in caves (Hungary) but rather rare.

Scoliocentra caesia (Meigen, 1830)

GREAT BRITAIN: South Wales: Ogof-Rhyd Sych, 18.10.77 (B): 1/0. FRANCE: gr. du Cormoran, Torcieu, Ain (COD10), 21.7.77 (B): 2/0. SUISSE: Höhle am Rütistein, SZ, 2.7.67 (S, A): 4/5; gr. de Prépunel, NE 12, 28.7.80 (A): 2/0; gr. du Grand Bochat, NE 33, 17.7.78 (S, A): 3/4; gr. des Dentaux, VD 21, 20.6.79 (A, S): 1/0; gr. aux Pardes, NE 51, 23.7.78 (A): 1/1; gr. de la Baume, NE 4, 11.7.78 (S, A): 0/1; gr. de Vers-chez-le-Brandt, NE 1, 11.7.78 (S, A): 3/3; *ibid.*, 27.8.80 (H, S, A): 1/0 (with numerous mites); *ibid.*, 27.8.80 (H, S, A): 1/7. 40 specimens.

It is still a little known species, it was misidentified several times. Recently the species of its species-group have been revised on the base of male genitalia (PAPP 1981: *Fauna Hungariae*, 15(5): 64-66).

Scoliocentra confusa (Wahlgren, 1918)

FRANCE: gr. des Rochelles, Les Bouchoux, Jura, 1.8.64 (C): 0/1; gr. des Cinq, Torcieu, Ain, 3 m, 3.76 (B): 0/1.

Hitherto known only from Sweden (Lappland), Germany and St. Moritz. A rare species, the above data are the first records from caves.

Scoliocentra spectabilis (Loew, 1862)

SUISSE: gr. Vers-chez-le-Brandt, NE 1, 11.7.78 (S, A): 1/0; *ibid.*, 27.8.80 (H, S, A): 1/2.

This species lives only in the central part of Europe (Germany, Poland, Czechoslovakia, Austria, Hungary and Yugoslavia); repeatedly found in caves (see also ALLEN & STRINATI 1962).

***Scoliocentra villosa* (Meigen, 1830)**

SUISSE: Cave Noire, VD 43, 26.5.60 (S): 0/1; gr. des Roches Bornel, NE 42, 17.7.78 (S, A): 0/1. FRANCE: gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., piège molester, 12.7.78 (B): 1/0; gr. de Roche Chabée, Ranchette, Jura, 12.3.67 (C): 3/0; gr. de Combe-la-Botte, Colombotte, Hte-Saône, 5.11.66 (hC): 1/0; gouffre de Lent, Torcieu, Ain, 20.4.77 (B): 0/1; gr. du Cormoran, Torcieu, Ain, 3.76, 20 m (B): 2/0. 10 specimens.

A troglophilous species. Its distribution ranges from Lappland to France and Hungary but its populations are rather sporadic.

SPHAEROCERIDAE

***Copromyza (Crumomyia) freyi* Hackman, 1965**

SUISSE: gr. de Lajoux, BE 10, 28.9.77 (S, H, B): 1/0.

A very rare species; hitherto known from Finland and Mongolia. New to Switzerland and also for the fauna of the Alps.

***Copromyza (Crumomyia) glabrifrons* (Meigen, 1830)**

SUISSE: gr. de Prépunel, NE 12, 28.7.80 (A): 2/4; *ibid.*, 8.10.78: 6/6; gr. de Verschez-le-Brandt, NE 1, 11.7.78 (S, A): 1/0; *ibid.*, 27.8.80 (H, A, S): 1/1; Tanne à Brissac, Villeneuve, VD 22, 20.6.79 (A, S): 2/1; gr. des Dentaux, VD 21, 20.6.79 (A, S): 1/1. FRANCE: gr. du Brudour, Drôme, 30.6.80 (S, A): 1/1; gr. de la Bâtie B, Viry, Jura, 14.7.65 (C): 0/1.

A widely distributed psychrophilous species, which are developing also in the entrance zone of caves.

***Copromyza (Crumomyia) glacialis* (Meigen, 1830)**

FRANCE: gouffre G 10, Bois du Petit Faily, Meuse, 10.77 (P. Gomez): 1/1; gr. du Cormoran, Torcieu, Ain, 10.76, 11.76, 15 m (B): 1/1. North and Central Europe. A species unable to tolerate higher temperature; repeatedly found in caves but in winter it has been collected in low altitudes, in summer only on high mountains.

***Copromyza (Crumomyia) nigra* (Meigen, 1830)**

SUISSE: Cave Noire, VD 43, 26.5.60 (S): 1/2; Nidlenloch, SO 1, 25.5.72 (S, A): 1/0; Rotloch, GR 3, 8.8.63 (S, A): 6/7; Unter-Rotloch, GR 4, 8.8.63 (A, S): 4/5; Tanne à Brissac, Villeneuve, VD 22, 20.6.79 (A, S): 3/2. FRANCE: trou de la Baume, Poligny, Jura, 30.5.66 (C): 1/0; gouffre G 10, Bois du Petit Faily, Meuse, 10.77 (P. Gomez): 1/1. 34 specimens.

A common species on droppings of various mammals and often found in caves. The specimens which are collected in caves have longer hairs on legs and body than the specimens on droppings.

***Copromyza (Crumomyia) notabilis* (Collin, 1902)**

FRANCE: gr. des Droums, Goumois, Doubs, 17.10.61 (G): 1/0; gr. du Cormoran, Torcieu, Ain, 3—15 m, 3.76—11.76 (B): 18/11. 30 specimens.

Its life habit is the same as for *glacialis*. For distribution data see ROHÁČEK 1976 and PAPP 1978. New to France.

***Copromyza (Fungobia) fimetaria* (Meigen, 1830)**

FRANCE: lésine des Ecolais, Choux, Jura, 18.8.66 (C): 1/0; gouffre de Lent, Torcieu, Ain, S1, 23.11.76 (B): 0/1. GREAT BRITAIN: South Wales: Ogof-Rhyd Sych, 18.10.77 (B): 0/1.

Owing to misidentifications it is still a little known species but surely not troglophilous.

***Copromyza (Fungobia) nitida* (Meigen, 1830)**

SUISSE: gr. aux Pardes, NE 51, 23.7.78 (A): 1/0. FRANCE: gr. des Ecolais D, Choux, Jura, 17.8.66 (C): 0/1; gr. du Tremplin, La Pesse, Jura, 6.8.64 (C): 1/0; gr. du Cormoran, Torcieu, Ain, 3—27 m, 6.76—11.76 (B): 12/7; *ibid.*, COD3, 14.7.77 (B): 1/1; gouffre de Lent, Torcieu, Ain, 20.4, 21.6., 31.8.77 (B): 3/2; gr. des Cinq, Torcieu, Ain, 3 m, 6.76 (B): 1/0. 30 specimens.

Earlier it was regarded as a hemitroglophilous species (PAPP 1978), i.e. this species is rather common in the entrance zone of caves.

***Copromyza (Fungobia) roseri* Rondani, 1880**

FRANCE: gr. du Cormoran, Torcieu, Ain, 3—7 m, 4.76, 11.76 (B): 2/2; *ibid.*, COD9, 21.7.77 (B): 0/1; *ibid.*, COD3, 14.7.77 (B): 7/14; gr. de St-Vincent, Mélan, Thoard, Alpes Hte-Prov., 13.4.77 (B): 0/1; gr. de la Ture, Autrans, Isère, échantillon de terre, 1.6.75 (Besuchet): 1/0. 28 specimens.

New to France. It was found also in caves of Hungary.

***Leptocera caenosa* (Rondani, 1880)**

YUGOSLAVIA, Dalmatia: Spilja Sipun, prélèvement de terre 1.8.76 (H, S): 0/1.

A widely distributed Holarctic species, often found in the entrance zone of caves.

***Puncticorpus cribratum* (Villeneuve, 1918)**

ITALY: Addaura III Caprara, Palermo, Sicily, 21.8.56 (S): 0/2.

Since the southern most occurrence datum for *P. cribratum* is South Hungary (Roháček, personal communication), it is questionable whether these specimens belong

to *cribatum*. It is necessary to collect males of *Puncticorpus* in South Europe for final decision.

***Puncticorpus lusitanicum* (Richards, 1963)**

MOROCCO: gr. d'Aïn el Aouda, Taza, 2.10.79 (S, A): 1/0.

Hitherto known only from Portugal, new to Morocco. Its identification was kindly corroborated by Dr J. Roháček (Opava), to whom I express here my most sincere thanks.

***Limosina bequaerti* (Villeneuve, 1917)**

FRANCE: gr. du Brudour, Drôme, 30.6.80 (S, A): 1/0. AUSTRIA: Weinstockstollen III bei Innsbruck (Tirol), Barberfalle, 6.12.65 (H): 2/0. A troglophilous species with wide distribution in Europe; found also in cellars and in burrows and nests of small mammals.

***Limosina claviventris* Strobl, 1909**

GERMANY: gr. près de la Teufelshöhle, Pottenstein, 12.9.70 (S): 1/0. FRANCE: gr. des Cinq, Torcieu, Ain, 5 m, 8.76 (B): 0/1; gr. de l'Evêque, Torcieu, Ain, 3 m, 10.76 (B): 0/1.

It is a common species in humid soils and in small mammal nests in Central Europe. It occurs not only in the entrance zone of caves but also in aphotic part owing to the negative phototaxis of this species.

***Limosina clunipes* (Meigen, 1830)**

SUISSE: baume Barrée, Les Bayards, NE, 12.61 (J): 0/1; gr. aux Pards, NE 51, 23.7.78 (A): 2/0. FRANCE: gr. de la Bâtie B, Viry, Jura, 14.7.65 (C): 1/1; gr. de la Pisserette, Moirans-en-Montagne, Jura, 22.11.64 (C): 0/1; gr. du Puits Perdu, Plagne, Ain, 3.8.65 (C): 1/0; gr. du Cernétrou, La Pesse, Jura, 14.8.64 (C): 0/1; gr. des Ecolais B, Choux, Jura, 24.8.63 (C): 2/0; gr. du Cormoran, Torcieu, Ain, 27 m, 7.76 (B): 1/0; *ibid.*, 15 m, 8.76: 3/2; *ibid.*, COD9, 21.7.77: 0/1; *ibid.*, COD4, 14.7.77: 0/1; gr. de Pont-la-Dame, Aspres-sur-Buëch, Htes-Alpes, 5.5.77 (B): 1/0; gouffre de Lent, Torcieu, Ain, 23.11.76 (B): 0/1. 20 specimens.

A widely distributed species with wide ecological valence but surely not troglophilous.

***Limosina denticulata* Duda, 1924**

FRANCE: gr. de Quincey, Hte-Saône, 3.12.66 (hC): 0/1.

A troglonexic species, its larvae develop in manure first of all in mountain regions of Europe; this is its first record from caves.

***Limosina flaviceps* Zetterstedt, 1847**

GREAT BRITAIN: South Wales: Ogof-Rhyd Sych, 18.10.77 (B): 3/0.

A very rare psychrophilous species, found also in caves in Germany (PAPP & PLACHTER 1976).

Limosina parapusio Dahl, 1909

FRANCE: gr. de l'Evêque, Torcieu, Ain, 2 m—5 m, 6.76, 10.76 (B): 0/15; gr. du Cormoran, Torcieu, Ain, 5 m, 20 m, 7.76 (B): 0/6. 21 females.

This is a fungivorous species. Males are very seldom found, and propagation is usually by parthenogenesis.

Limosina palmata (Richards, 1927)

FRANCE: gr. du Lichen, Onnion, Hte-Savoie, 19.8.64 (S, R, A): 2/1. A terricolous species, imagoes also on droppings of mammals, only exceptionally in caves.

Limosina racovitzai Bezzi, 1911

SUISSE: gr. du Chemin de Fer, NE 14, 31.12.61 (G, A): 1/0; *ibid.*, 26.4.60 (A): 1/1.
FRANCE: gr. de Pont-la-Dame, Aspres-sur-Buëch, Htes-Alpes, 5.5.77 (B): 1/0.

A troglophilous species found also in caves of Switzerland earlier (Strinati 1966).

Limosina silvatica (Meigen, 1830)

GREAT BRITAIN: South Wales: Ogof-Rhyd Sych, 18.10.77 (B): 1/2. SUISSE: Bruderloch, TH 1, 30.6.67 (S, A): 1/1; baume de Bêtre, VS 12, 10.8.62 (A, S): 3/0; Schälloch, BE 50, 11.8.77 (S, H): 3/0; gr. de Lajoux, BE 10, 28.9.77 (S, B, H): 1/2; gr. aux Pardes, NE 51, 23.7.78 (A): 11/10; Tanne à Brissac, Villeneuve, VD 22, 20.6.79 (A, S): 2/2. FRANCE: gr. du Brudour, Drôme, 30.6.80 (S, A): 1/1; gr. du Trilobite, Arcy-sur-Cure, Yonne, 10.6.71 (S): 1/1; lésine des Cordules, Echallon, Ain, 21.8.68 (C): 0/1; gr. de la Grande Baume, Chaux-lès-Port, Hte-Saône, 10.6.66 (hC): 0/1; gr. du Cormoran, Torcieu, Ain, 3 m—30 m, 6.76.—11.76 (B): 15/20; *ibid.*, COD9, COD10, 21.7.77 (B): 1/3; *ibid.*, COD3, COD4, 14.7.77 (B): 1/1; gouffre de Lent, Torcieu, Ain, 29.7.76, 20.4., 21.6.77 (B): 2/3; gr. de la Ture, Autrans, Isère, échantillon de terre, 1.6.75 (Besuchet): 0/1. 92 specimens.

Common in the entrance zone of caves, often in aphotic parts but abundant also in soil of mountain forests and also from lowland, from autumn till early spring.

Limosina villosa Duda, 1918

MOROCCO: gr. d'Aïn el Aouda, Taza, 2.10.79 (S, A): 0/1.

A mediterranean species. This is its first record from caves.

DROSOPHILIDAE

Leucophenga maculata (Dufour, 1839)

SUISSE: grotta del Tanone, TI 7, 14.11.64 (A, R, S): 0/1.

A scotophilous troglonexic species, which was reared from fruiting body of fungi in several cases.

***Drosophila (Sophophora) obscura* Fallén, 1823**

FRANCE: gr. des Cinq, Torcieu, Ain, 6.76., 2 m, (B): 0/2. Trogloneic.

***Drosophila (Sophophora) subobscura* Collin, 1936**

FRANCE: gr. des Cinq, Torcieu, Ain, 1 m outside, at entrance, 3 m, 6.76—8.76 (B): 0/7; gr. de l'Evêque, Torcieu, Ain, 1 m outside, 2 m, 6.76—8.76 (B): 1/5.

First records for these *Sophophora* species from caves. They do not belong to the fauna of caves.

***Drosophila (Sophophora) sp.*, females of the *obscura*-group**

FRANCE: gouffre de Lent, Torcieu, Ain, 20.4.77 (B): 0/1; gr. des Cinq, Torcieu, Ain, at entrance, 3 m, 6.76—8.76 (B): 0/2.

No closer identification was possible owing to the poor state of preservation of the specimens.

MILICHIIDAE

***Leptometopa aelleni* L. Papp, 1978**

NOUVELLE CALÉDONIE: gr. de Lindéralique, Hienghène, guano, 3.8.78, S. & J. Peck (Berlese, No. 14): 0/2.

It was described from New Caledonia and now it was found again in an other cave there.

***Leptometopa latipes* (Meigen, 1830)**

KENYA: gr. de Shimoni B, 70 km SW Mombasa, prélèvement de terre, 28.9.75 (S, A): 0/1; gr. de Similani, 10 km S Mombasa, 29.9.75 (A, S): 4/2.

A widely distributed species, known also from Kenya.

***Pholeomyia* sp.**

VENEZUELA, cueva del Guacharo, Monagas, 18.2.68 (S): 1/0.

In all probability this specimen belongs to a new species but more material is necessary to make a good description in this genus containing numerous closely related species.

MUSCIDAE

***Fannia scalaris* (Fabricius, 1797)**

FRANCE: gr. du Lichen, Onnion, Hte-Savoie, 19.8.64 (S, R, A): 1/0. Trogloneic.

Musca domestica (Linné. 1767)

FRANCE: gr. de St-Vincent, Mélan, Alpes Hte-Prov., piège molester, 12.7.78 (B): 1/0. This record is an example to illustrate the statement in introduction: all of the fly species of a given area can be found in caves, only the probability of a catch is much lower than for troglophilous species.

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